# **Co-Living Spaces: Affordable, Community-Oriented Housing**

Co-Living Spaces is a business focused on providing affordable, community-oriented housing solutions for remote workers and students. These spaces offer a shared living experience where tenants can access private rooms, shared amenities, and participate in curated community events. The business aims to create a sense of belonging while addressing the challenges of affordability and isolation often faced by these demographics.

### ****Tenants Table****

* **TenantID** (INTEGER, Primary Key, Auto-incremented)*:* Unique identifier for each tenant.
* **Name** (VARCHAR(100))*:* The full name of the tenant, randomly selected using Faker.
* **Email** (VARCHAR(100), UNIQUE)*:* The tenant’s email address, uniquely generated using Faker.
* **Phone** (VARCHAR(15))*:* The contact number of the tenant, randomly assigned.
* **MoveInDate** (DATE)*:* The date when the tenant moved in, following a Poisson distribution with a mean of 30 days.
* **MoveOutDate** (DATE, Nullable)*:* The date when the tenant moved out, following an Exponential distribution with a mean of 180 days, meaning most tenants leave within a typical period while some stay longer.

**Example**:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TenantID** | **Name** | **Email** | **Phone** | **MoveInDate** | **MoveOutDate** |
| 1 | John Doe | john.doe@example.com | 555-1234 | 2023-02-15 | 2023-08-10 |
| 2 | Alice Smith | alice.smith@example.com | 555-5678 | 2023-03-20 | 2023-09-25 |

### ****Employees Table****

* **EmployeeID** (INTEGER, Primary Key, Auto-incremented)*:* A unique identifier for each employee.
* **Name** (VARCHAR(100))*:* The full name of the employee, randomly selected using Faker.
* **Role** (VARCHAR(50))*:* The job position of the employee, assigned based on weighted probabilities (Manager: 10%, Cleaner: 30%, Receptionist: 20%, Technician: 40%).
* **Contact** (VARCHAR(15))*:* The contact number of the employee, randomly assigned.

**Example**:

|  |  |  |  |
| --- | --- | --- | --- |
| **EmployeeID** | **Name** | **Role** | **Contact** |
| 1 | Mark Taylor | Manager | 555-9876 |
| 2 | Sarah Brown | Cleaner | 555-4321 |

### ****Rooms Table****

* **RoomID** (INTEGER, Primary Key, Auto-incremented)*:* A unique identifier for each room.
* **RoomType** (VARCHAR(50))*:* The type of room (Single, Double, Suite), assigned based on predefined probabilities (Single: 50%, Double: 35%, Suite: 15%).
* **Availability** (BOOLEAN)*:* The availability status of the room, modeled using a Bernoulli distribution where 70% of rooms are available and 30% are not.
* **Price** (DECIMAL(10,2))*:* The cost per night for the room, following a normal distribution where the mean price depends on the room type (Single: $100, Double: $150, Suite: $250) with a standard deviation of 10% of the mean.
* **EmployeeID** (INTEGER, Foreign Key to Employees(EmployeeID), Nullable)*:* The employee responsible for managing the room, randomly assigned from the list of employees.

**Example**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **RoomID** | **RoomType** | **Availability** | **Price** | **EmployeeID** |
| 1 | Single | True | 100.00 | 1 |
| 2 | Suite | False | 250.00 | 2 |

### ****Reservations Table****

* **ReservationID** (INTEGER, Primary Key, Auto-incremented)*:* A unique identifier for each reservation.
* **TenantID** (INTEGER, Foreign Key to Tenants(TenantID))*:* The tenant who made the reservation, randomly selected.
* **RoomID** (INTEGER, Foreign Key to Rooms(RoomID))*:* The room that was reserved, randomly assigned from available rooms.
* **StartDate** (DATE)*:* The reservation start date, following a normal distribution centered around peak periods such as summer, with a standard deviation of 30 days.
* **EndDate** (DATE)*:* The reservation end date, following an exponential distribution with a mean of 7 days, meaning short stays are more common but longer stays occur occasionally.

**Example**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ReservationID** | **TenantID** | **RoomID** | **StartDate** | **EndDate** |
| 1 | 1 | 2 | 2023-06-15 | 2023-06-22 |
| 2 | 2 | 1 | 2023-07-05 | 2023-07-12 |

### ****Events Table****

* **EventID** (INTEGER, Primary Key, Auto-incremented)*:* A unique identifier for each event.
* **EventName** (VARCHAR(100))*:* The name of the event, randomly generated using Faker.
* **Date** (DATE)*:* The date of the event, modeled using a normal distribution centered around weekends or holidays with a standard deviation of 15 days.
* **Location** (VARCHAR(100), Nullable)*:* The location of the event, randomly assigned using Faker.
* **RoomID** (INTEGER, Foreign Key to Rooms(RoomID), Nullable)*:* The room assigned for the event, randomly selected.
* **EmployeeID** (INTEGER, Foreign Key to Employees(EmployeeID), Nullable): The employee responsible for organizing the event, randomly assigned.
* **StartTime** (TIME)*:* The starting time of the event, uniformly distributed between 9:00 AM and 9:00 PM.
* **EndTime** (TIME)*:* The ending time of the event, uniformly distributed and constrained to be after the start time.

**Example**:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EventID** | **EventName** | **Date** | **Location** | **RoomID** | **EmployeeID** | **StartTime** | **EndTime** |
| 1 | Tech Meetup | 2023-08-10 | Downtown Hall | 1 | 1 | 14:00 | 16:00 |
| 2 | Yoga Class | 2023-09-15 | Rooftop Garden | 2 | 2 | 10:00 | 11:30 |

### ****Participation Table****

* **ParticipationID** (INTEGER, Primary Key, Auto-incremented)*:* A unique identifier for each participation record.
* **TenantID** (INTEGER, Foreign Key to Tenants(TenantID))*:* The tenant participating in the event, randomly selected.
* **EventID** (INTEGER, Foreign Key to Events(EventID))*:* The event in which the tenant is participating, randomly assigned.
* **Status** (VARCHAR(20), Default: ‘Confirmed’)*:* The status of participation, assigned based on weighted probabilities (Confirmed: 70%, Pending: 20%, Cancelled: 10%).

**Example:**

|  |  |  |  |
| --- | --- | --- | --- |
| **ParticipationID** | **TenantID** | **EventID** | **Status** |
| 1 | 1 | 1 | Confirmed |
| 2 | 2 | 2 | Pending |

## **Assumptions & Challenges in Data Generation and Business Model**

During the data generation and database population process, several assumptions and challenges were made to simulate a **realistic co-living environment**:

1. **Tenant Behavior & Stay Duration**
   * Tenants **move in** following a **Poisson distribution** with a mean interval of **30 days** (suggesting regular sign-ups).
   * Move-out dates are **exponentially distributed** with a **mean of 180 days**, meaning most tenants leave within six months, but some stay longer.
   * Some tenants **do not have a move-out date** (NULL values), assuming they are still residing in the co-living space.
2. **Room Availability & Pricing**
   * **70% of rooms are available** at any given time, based on a **Bernoulli distribution**.
   * **Room pricing follows a normal distribution**, with means set at:
     + Single Room: **$150**
     + Double Room: **$300**
     + Suite: **$500**
   * A **10% standard deviation** ensures slight variations in pricing, mimicking real-world pricing dynamics.
3. **Reservations & Seasonal Demand**
   * Reservation **start dates** follow a **normal distribution centered around peak seasons** (e.g., summer).
   * **Short stays (7-day average)** are modeled with an **exponential distribution**, assuming some guests extend their stays.
   * Every reservation is made by a **valid tenant and assigned to an available room**, ensuring no overbooking.
4. **Employee Roles & Assignments**
   * Employees are assigned to **roles based on weighted probabilities**:
     + **Managers: 10%**
     + **Cleaners: 30%**
     + **Receptionists: 20%**
     + **Technicians: 40%**
   * Some employees are **randomly assigned to manage rooms** or **organize events**.
5. **Event Participation & Status**
   * **70% of tenants confirm participation**, while **20% are pending**, and **10% cancel**.
   * Events occur mostly on **weekends and holidays** (modeled using a **normal distribution** around those dates).